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ABSTRACT

This document provides an outline of the Research Training Fellowship Program at the Walter Reed Army Institute of Research. Emphasizing the scientific foundations of military medicine, the course aims at preparing medical corps officers for careers in laboratory research or clinical investigation and teaching. The intent is to give officers who have completed specialty training a chance for fellowship work in a research environment. This will enable them to gain skills in research design and analysis and acquire familiarity with important developments in broad areas of medical science. (HS)

COVER SHEET

OFFICE OF THE ASSOCIATE COMMANDANT

APRIL 1970

WALTER REED ARMY INSTITUTE OF RESEARCH
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D. C. 20012

RESEARCH TRAINING FELLOWSHIP PROGRAM
(FORMERLY MILITARY MEDICINE AND ALLIED SCIENCES COURSE)

MOS for which trained: None

Course Length: 52 weeks

Approved by:

The Surgeon General

Department of the Army

Washington, D.C.

SECTION I - PREFACE

A. Course: Research Training Fellowship Program (Formerly: Military Medicine and Allied Sciences Course)

B. Location: Walter Reed Army Institute of Research
Walter Reed Army Medical Center
Washington, D.C. 20012

C. Length: 52 weeks.

D. Purpose: Emphasizing the scientific foundations of military medicine, the course aims at preparing medical corps officers for careers in laboratory research or clinical investigation and teaching. The intent is to give officers, who have completed specialty training, a chance for fellowship work in a research environment while gaining skills in research design and analysis and acquiring familiarity with important developments in a broad area of medical science.

E. Prerequisite:

1. Active duty assignment in Medical Corps, USA. (Opening available to active duty MC's from USAF or USN).
2. Completion of residency training.
3. Interest and promise shown in academic medicine, and/or research. Although interested officers may apply for the course, individuals are primarily selected to this course in a manner analogous to senior service schools.

F. Instructional Objectives: The course purpose is pursued by:

1. An academic 'core' program which has the aims of:

a. Developing skill in the design of biomedical experiments and analysis of scientific problems.

b. Providing a contemporary foundation in basic biological sciences.

c. Insuring contact with important developments in medical science beyond the fellow's research speciality. Emphasis is given to problems in military medicine.

d. Acquainting the fellow with topics in R & D management.

2. A research training fellowship in one of the research divisions of the institute (e.g. immunology, infectious disease, gastroenterology, experimental pathology, neurophysiology) which has the following aims:

a. Providing a sustained, orderly supervised appreciation of laboratory research.

b. Giving most fellows a chance to design and execute experiments of their own.

c. Acquiring specific research skills which will be of use in subsequent laboratory or clinical research assignments.

G. Scope:

1. Fellowship portion of the program is directed by the appropriate research division director and supervised by the Commandant and Faculty Board. The details of the fellowship vary with the department involved and the fellow's needs and background. A

paper suitable for publication will normally be expected of the fellow. Interdisciplinary research is possible.

The fellow will normally attend one scientific meeting in his field.

2. The academic core occupies approximately 28% of the scheduled program, but is arranged to minimally interfere with fellowship hours, e.g., using noon lectures and Saturday morning lectures. Several R & D lab visits are included. The academic program also includes laboratory and other non-lecture hours.

3. Summary of Academic Program:

a.	Mathematics, Computer Theory and Applications, Operational Research and Systems Analysis	76 hrs.
b.	Biophysics and Physical Chemistry	120 hrs.
c.	Biostatistics	86 hrs.
d.	Design of Experiments, Scientific Method	84 hrs.
e.	General Military Medicine, R&D Management	40 hrs.
f.	Methods in Biochemistry	48 hrs.
g.	Basic Cellular Biology	24 hrs.
h.	Immunology	34 hrs.
i.	Microbiology and Infectious Disease	50 hrs.
j.	Pharmacology	22 hrs.
k.	Physiology	36 hrs.
l.	Neurophysiology & Behavioral Science	40 hrs.
m.	Environmental Medicine	48 hrs.
n.	Problems in Specific Medical Disciplines (Related to Military Medicine)	98 hrs.
o.	Miscellaneous (Lab Animals, Medical Writing)	16 hrs.

Section II - Annexes

ANNEX A

MATHEMATICS, COMPUTERS, SYSTEMS ANALYSIS

Hours: 76

Method of Instruction: L, PE, D

Purpose: (1) To reinforce fellow's ability to apply algorithmic manipulations basic to subsequent disciplines of Course.

(2) To familiarize students with principles of computer operation and demonstrate medical applications.

(3) To introduce fellows to the field of operations research/systems analysis and its medical applications.

Scope: (1) Practical and theoretical instruction in mathematics from review of algebra through calculus, elementary differential equations, Boolean algebra and matrices.

(2) Practical and theoretical instruction in information theory, computer function and programming. Demonstration of medical applications.

(3) Introduction to OR/SA to include instruction in such techniques as linear programming and queueing theory. Practical experience in applications to medical decision making.

ANNEX B

BIOPHYSICS AND PHYSICAL CHEMISTRY

Hours: 120

Method of Instruction: L, PE

Purpose: To provide background information in physics and physical chemistry to permit a more profound understanding of biological systems.

Scope: (1) Classical physics is reviewed, stressing biological and medical examples.

(2) Recent developments in physics (electron spin resonance, lasers) are surveyed.

(3) Thermodynamics, atomic and molecular structure, reaction kinetics are examined, using biological examples. Measurement methods are discussed.

ANNEX C

BIOSTATISTICS

Hours: 86

Method of Instruction: L, PE

Purpose: To give students methods to analyze quantitative and descriptive data. Use of statistical techniques in decision making in the experimental situation is covered.

Scope: Descriptive statistics, analysis of variance, non-parametric analyses, factorial analysis, regression analysis, bioassay.

ANNEX D

SCIENTIFIC METHOD AND DESIGN OF EXPERIMENTS

Hours: 84

Methods of Instruction: L, PE

Purpose: (1) To explicitly examine the philosophical, historical and logical bases of the scientific method.

(2) To show how experiments can be designed to decrease bias and increase efficiency, and to prepare fellows for critical evaluation of his own and other workers' research.

Scope: Senior scientists present a variety of outlooks on the scientific method in a survey. Models of experimental design and techniques of design analysis.

ANNEX E

MILITARY MEDICINE, R&D MANAGEMENT

Hours: 40

Method of Instruction: L, PE, C, DN

Purpose: To survey significant military medical problems and to gain an understanding of how military medical research is organized and managed.

Scope: Familiarization with current important Army operational problems (e.g., malaria, enteric diseases) with attention given to USN, USAF, DOD and foreign systems. Laboratory management problems are studied.

ANNEX F

BIOCHEMISTRY METHODS

Hours: 48

Method of Instruction: L, PE

Purpose: To review recent developments in biochemistry, and give the student practical contact with current techniques of biochemical analysis.

Scope: Regulatory and informational aspects of biochemical systems (including enzyme regulation), component alterations, analytic methods.

ANNEX G

BASIC CELL BIOLOGY

Hours: 24

Method of Instruction: L, PE, C

Purpose: To synthesize contemporary insights into cell structure and function.

Scope: Cytogenetics, transmission and scanning electronmicrography, tissue culture, cell membrane properties, cellular radiobiology.

ANNEX H

MICROBIOLOGY AND INFECTIOUS DISEASE

Hours: 54

Method of Instruction: L, PE, D

Purpose: To survey developments in microbiology and relate these to militarily important infections.

Scope: Viral and bacterial genetics, chemistry, drug interactions, interferon, transfer factors, biology of plasmodia, normal flora, ecology of several infections, hepatitis, specific military problems.

ANNEX I

IMMUNOLOGY

Hours: 34

Method of Instruction: L, PE, D

Purpose: To give the fellows a practical appreciation of contemporary immunology and its applications.

Scope: History, classical immunology, immunochemistry, globulins, complement system, hypersensitivity, lymphocyte origins, functions.
Applicatory immunology to infectious d sease, clinical medicine and surgery.

ANNEX J

PHARMACOLOGY

Hours: 22

Method of Instruction: L, D

Purpose: To examine drug-tissue interactions, drug development.

Scope: Molecular level drug reactions, drug interactions, metabolism, adverse reactions, and analysis. Antimicrobials, antimalarial development. Current federal regulation.

ANNEX K

PHYSIOLOGY

Hours: 36

Method of Instruction: L, C, PE

Purpose: To study selected methods and developments in physiology, related to military problems.

Scope: Cardiovascular, Gastrointestinal, Skeletomuscular and Endocrine as adaptive systems.

ANNEX I

NEUROPHYSIOLOGY AND BEHAVIORAL SCIENCE

Hours: 40

Method of Instruction: L, C, D

Purpose: To synthesize and apply current information on brain structure, function with techniques of behavioral analysis and modification.

Scope: Neuroanatomy, physiology, chemistry, information processing, neuro-endocrine relationships, operant effects on autonomic activity, operant psychology, semantics, anthropology, groups, psychiatry, military and medical applications.

ANNEX M

ENVIRONMENTAL MEDICINE

Hours: 48

Method of Instruction: L, D

Purpose: To give fellows an appreciation of importance of environmental medicine in a military setting.

Scope: Physical stresses (heat acceleration, altitude exercise, cold), responses and adaptions, survey of aviation, diving, space medicine, complex interactions with performance (sleep, drugs, circadian phenomena, fear).

ANNEX N

PROBLEMS IN SPECIFIC MEDICAL DISCIPLINES

Hours: 98

Method of Instruction: L, C, D

Purpose: To relate clinical and basic science developments to military medicine; organized around problems in main divisions of military medicine.

Scope: Internal medicine: infectious disease, enteric disease, endocrinology, hematology, nutrition and metabolism; Pediatrics; Surgery: trauma, rehabilitation, burns, infection, wound and stress complications, wound healing, prosthetics; Pathology: clinical laboratory developments, wound analysis, toxicology; OB/GYN: demography, population growth, reproductive physiology; and other specialties. Medical decision-making and organization of care. Preventive medicine.

ANNEX O

MISCELLANEOUS (MEDICAL WRITING, LAB ANIMALS)

Hours: 16

Method of Instruction: L, PE, D

Purpose: To give fellows higher skill in medical writing and to permit more sophisticated use of animal models in research.

Scope: (1) Use of data sources, notation, illustration, clear writing.

(2) Selection, care and use of lab animals. Zoonoses, survey of models of human disease. Laws and regulations.